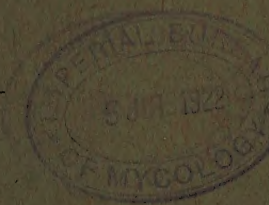


Verkrijgbaar bij den Phytopathologischen Dienst.

VERSLAGEN EN MEDEDELINGEN  
VAN DEN PHYTOPATHOLOGISCHEN DIENST  
TE WAGENINGEN No. 16a.

**BLACK SCAB**  
(WART DISEASE)  
**IN THE NETHERLANDS**



MAART 1921

DRUK: H. VEENMAN, WAGENINGEN.



## BLACK SCAB OR WART DISEASE IN POTATOES.

**Symptoms.** Black Scab is cognizable by the verrucose (warty) deformations of the foliaceous organs of the potato-plant below and just above the surface of the ground. The said deformations become most typically apparent in the tubers, whose eyes, i.e. leaf-buds, are deformed into warts of various sizes. In the more immune varieties or when slightly affected, the warts are small and not conspicuous; they will grow large-sized when more strongly affected, and in a seriously contaminated soil the whole potato may be converted into such a wart (fig. 5, plate II). Especially in slightly tainted tubers it becomes apparent that the warts are exclusively caused by the degeneration of the buds (eyes) (fig. 3, plate II). Consequently they will not be found on the skin between the eyes.

The foliage proper may be likewise transformed into warts, especially such leaves as spring from the sprouts that develop in the axils of the nether leaves during the months of June and July; the leaves being transformed into big, green, cauliflower-like bodies. The same process is found in such sprouts as appear above the ground at a later period by the side of the earlier ones; at a level with the ground they will develop into similar large, green, cauliflower-like bodies, which can grow in the axils of the main stalk and obtain a diameter of 3 inches and more (fig. 1, plate I). During the growth of the plant, black scab may be perceived by the field-inspector by examining both the deformation of the buds in the axils of the main stalk and such as grow on lateral stalks, that crop out at some distance from the main stalk. One should, however, be mindful of the fact that in August, if the weather is warm and wet, the large green warts will be apt to get putrid and disappear, which may also happen to the warts on the tubers and to tubers completely changed into warts. The warts growing on tubers are white and firm when young, but after having grown larger and less compact they will quickly begin to decay, and the putrefaction may proceed into the otherwise sound tissue of slightly attacked tubers.



In England it has been observed that the very petals (or flower-leaves) were deformed by black scab; in Holland the deformation of leaves has not been traced upwards of about 6 inches above-ground. Excepting the above-mentioned deformations, which are restricted as to place, the foliage is in no other way affected; on the contrary it is normally developed and healthy-coloured even in the most strongly affected plants. As to the under-ground parts, not only the tubers but also such parts as will develop buds (and leaves) are apt to produce warts under the influence of black scab. Likewise, stolons are frequently found to bear warts; the said stolons having proceeded from eyes that in normal circumstances would have grown into potatoes. (see fig. 1 and 2, plate I).

**Cause of the disease.** The above-mentioned warts and cauli-flower-like deformations are caused by a parasite that penetrates into the leaf-buds and stimulates them into abnormal growth. It is one of the lower classes of Phycomycetes (Algae-like fungi) viz. the Chytridinae, which is closely allied to the more familiar Peronosporae, which class includes the fungus that causes the common potato-blight. The fungi of the Chytridinae-class are distinct from the others in lacking a proper mycelium, as is to be found in the fungus of the common potato-blight and other more highly developed fungi. The fungus, originator of the Wart Disease, is known by the name of *Chrysophlyctis endobiotica*; it thrives in the diseased cells of the potato-plant. When examining microscopically a wart of a diseased potato, we find just below the skin in the tainted cells pretty, large brown corpuscles, being the generative organs of the parasite, in the present case known as „sporangia”<sup>1)</sup>. (fig. 7, plate II). The sporangia are provided with a thick membrane, which makes them proof against untoward influences, as cold and dessication; they are, indeed, destined to live through winter. Just now we described the sporangia as pretty large, which means of course in proportion of the spores of other fungi; as a fact the corpuscles are so small that a square m.m. will easily hold 300 of them. From this it may be inferred that a little wart can hold an enormous number of sporangia. After the putrefaction of the warts the sporangia come in contact

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1) A sporangium or spore-case of the Phycomycetes is a cell in which after the mature sporangium has found water-some independent spores are formed (the so-called zoöspores) by means of partition; these spores break forth and are able to move about for some time by means of a flagellum.

with the soil; next spring the zoöspores issue forth and penetrate into the young foliaceous organs of the potatoes. Probably not all sporangia will reach maturity in the following season, but a certain percentage will remain dormant till another season, even when circumstances favour their development, so that only part of the sporangia develop zoöspores; this would account for the fact that a once contaminated field may remain infected for a period of as many as 10 years. In fact, it has been observed that a harvest was strongly infected on fields on which no potatoes had been grown for ten years. However, there is another possibility: the fungus may prolong its life, either saphrophytically in the ground, or in some weed or other, pot-experiments having shown the possibility of infecting with the disease *Solanum dulcamara* (woody Nightshade) and *Solanum nigrum* (common nightshade) weeds akin to the Potato; it is true, on the field these weeds have never been found diseased. A third possibility is that the zoöspores can spring into activity only when living potatoes are near; (nothing is known, however, of the nature of the influence, exercised by the plant upon the sporangia). If so, one could account for the fact that the disease will crop up whenever potatoes are grown upon an infected field. It remains to be stated how long the sporangia can remain in a dormant state; no doubt, they can live through a period of 10 years.

Besides a sufficiently high temperature, water is wanted for the setting free of the zoöspores; hence it becomes evident that the virulence of the infection is dependent upon the nature of the soil and the weather conditions; the wetter they are, the greater chance there is of a virulent infection.

Besides the above-mentioned winter-spores, there are to be found in very young warts some similar sporangia, whose membranes, however, are less thick: the summer-spores, from which the zoöspores emerge into the tissue itself and penetrate into the adjoining cells.

The presence of the fungus continuously stimulates the cells into more frequent partition, which occasions an abnormally active growth of the organ affected, which however cannot attain its normal development, as the parasite incontinently penetrates into the newly built cells.

If a cell contains some zoöspores, they will form a mass of protoplasm, a so-called plasmodium, which wraps up the core of the cell and leads to its decay and shrivelling up. Finally the plasmodium splits up into bodies that will become either winter- or summer-sporangia, according as they cover



themselves with a thick membrane or a thin one. The ulterior behaviour of the sporangia has been described above.

**Extension. Spreading. Propagation.** The fungus is spread by using infected seed-potatoes, by transferring tainted tubers or by conveying mould, waste matter or manure containing spores of the fungus. Propagation through the medium of air is out of the question, considering the habitat and conditions of life of the fungus.

Consequently the disease may be inflicted upon a field by once using seed-potatoes, be it ever so little affected with the fungus. Therefrom it follows that of a large field one portion that can be accurately marked out, is affected with the warty disease, if the grower has transferred the disease to this particular plot. The surrounding parts of the field may keep free from infection for a very long period. As a rule, propagation seems to be due to manuring and to the constant use of infected seed-potatoes. Lateral extension into adjoining plots may occur, but — as far as we have been able to ascertain — appears to be of little consequence, if the plots are separated by means of a trench or a pretty large path.

The fact that seed-potatoes play an important part in spreading the disease, may be inferred from this observation: if black scab has been stated by a grower in one of his fields, he may be pretty sure that it will be found in all the other plots. Likewise, the transferring of the disease to other countries (e.g. America) must be attributed to the use of infected seed-potatoes.

It is highly probable, that manure and refuse of potatoes have contributed in our country to the spread of the disease. As a fact, in our country the disease is pretty nigh limited to small plots, cultivated by the tenants or owners themselves, who throw all their kitchen-waste on the dung-hill. In this way the peelings of warty potatoes will get into the manure, and into the dung of goats and pigs that feed on warty refuse-potatoes; the latter containing germs of disease, which can pass through the intestinal canal without being destroyed. In other countries similar facts have been stated.

**Detriment.** The damage caused by black scab, is either direct or indirect. Though in our country the disease is one of recent occurrence, the direct damage has been considerable in many cases, owing to the putrefaction of tubers on the field. On strongly infected grounds entire rows have been lifted without one sound tuber (Zandpad, Winschoten). Similar experiences

have been stated in articles of reviews from abroad. But also in cases of slight infection an inferior crop is gathered, that will not keep well and may even have lost some of its nutritive value. A very slight infection, however, will not interfere with the produce, because there is no waste owing to putrefaction; but after each growth the disease will appear to have increased, especially if the same plot is constantly used for the growth of potatoes (workmen's plots); already in the second year after using tainted seed-potatoes the disease may be detected above ground.

We cannot state any figures showing the extent of direct damage, but its importance is pointed out by the statement that in England the warty disease is now one of the most serious and detrimental potato-blight.

The indirect damage is of quite a different nature. It proceeds from the measures some countries are taking to prevent the import of black scab. Evidently these prohibitive measures are enjoined most strictly in case the disease is prevalent in the exporting country. The United States of America have gone so far as to entirely prohibit the import from countries where black scab prevails, and such as are suspected. Other countries require an official statement from which it appears that the lot to be imported is free from the disease or that the surroundings of the field of growth are unaffected. Evidently, such measures will greatly interfere with the export-trade and consequently with the cultivation of an exporting country like ours.

Therefore it is of the greatest importance that we should grapple with this plague to the utmost of our powers. In our country there is a prohibition of growing potatoes on infected fields, unless the variety be immune; in the latter case a special licence is required. This prohibition being vigorously enjoined, and an active inspection endeavouring to find out all the infected plots, these measures ought to afford sufficient guarantees against exporting infected lots.

**Extension. 1. Abroad.** Black Scab was first described in Hungary (1896). It must not be inferred from this fact that in this country the disease is most virulent. Concerning this matter we possess no reliable data. Probably the disease has attained its largest extension in England and Scotland. With certainty it can be traced down to 1898 in England, but according to reliable statements the typical symptoms were observed as early as about 1880, or even 1860; the first reliable state-



ments from Scotland date from about 1876. The question whether black scab is endemic in England or not, has not been settled. However, it is a fact that in this country the disease has spread over a large region, and that more especially the N. W. of England and the S. of Scotland are very strongly infected. The disease appears there not only on small plots (belonging to working men and private persons) but also on farmers' fields.

In Germany the warty disease seems to have spread to a rather large extent. Reliable and detailed statements are not to be had, but in Westphalia, the Rhine-provinces, Saxony, and in the environs of Hamburg and Lubeck, several cases have been noticed. No doubt, the region of the spread of the disease is far greater. Upon the whole it would seem that it is chiefly the smaller plots in industrial districts and round about the cities that are affected.

Further we possess some data about the spread of the disease in Sweden, and Norway and a few cases in Ireland. Belgium seems to be exempt as yet, but is considered as under suspicion by America, owing to its traffic with infected Germany during the war. In France, no more than in Denmark, black scab has been found yet. America is still open to the export of potatoes from these countries.

Outside of Europe, black scab has been detected only in the United States (Pennsylvania and West-Virginia); the disease having been introduced into that country by infected seed-potatoes.

2. *In the Netherlands.* Here black scab was first detected in 1915, when Mr. Uil, agricultural instructor at Winschoten, sent in for examination some potatoes which he suspected to be diseased. His suspicion proved true. The tubers belonged to a private person, growing potatoes for his own consumption in his garden, bordering upon the Zandpad. An investigation that was made in the spot showed that the disease could be traced into several little gardens in the neighbourhood. With the concurrence of the Groningen Union of Agriculturists all the infected crops that could be traced were purchased and destroyed. However, the potato-crop being already gathered in, no serious investigations could be instituted in the autumn of 1915.

Next year a minute inquiry was pursued in the surroundings of the plot that was found infected in 1915; both the crop on field and the tubers during the time of lifting were closely examined, and a number of fresh cases were ascertained. By far the greater part of the affected plots were found in the



immediate neighbourhood of the grounds previously infected. Some indications led us to neighbouring communities, where, likewise, the disease was found in some adjacent plots, whereas some plots lying at some distance one from the other (at Heiligerlee, Scheemda) proved to be leased and cultivated by one private person; so did some plots at Oostwold (Midwolda).

In 1916 the appearance of black scab was ascertained in 4 communities, viz. Winschoten, Midwolda, Scheemda and Wedde. In the three first-mentioned communities fresh cases of black scab were detected in succeeding years; in Wedde, notwithstanding minute inquiry, it kept restricted to one single case. All these allotments are at a distance of no more than 9 K.M. from Winschoten (fig. 8, plate III; fig. 9, 11 and 12, plate IV). Not before 1918 through the kind offices of Mr. Graver, agricultural instructor at Nieuw-Weerdinge, another case of black scab was stated on an allotment at a greater distance from Winschoten, viz. in the Roswinkel peat-grounds (Emmen). In 1920 a few more plots in these parts were found to be infected (fig. 10, plate IV).

The area of the grounds where the disease was found and which accordingly have been declared by the Minister Secretary of Agriculture, Trade and Industry, to be infected grounds, is shown by this table:

	Winschoten.		Midwolda.		Scheemda.		Wedde.		Nieuw-Weerdinge.		Total amount.
	Number of allotments	Area in H.A.	Number of allotments	Area in H.A.	Number of allotments	Area in H.A.	Number of allotments	Area in H.A.	Number of allotments	Area in H.A.	
1916	45	26.22.68	8	7.27.16	4	1.57.00	1	0.45.20	—	—	35.52.04
1917	10	1.28.36	3	4.12.41	—	—	—	—	—	—	5.40.77
1918	23	5.57.68	2	0.67.54	—	—	—	—	—	—	6.25.22
1919	9	6.77.60	3	6.69.85	6	2.02.40	—	—	1	0.60.50	16.10.35
1920	10	5.44.62	3	0.46.44	1	0.42.24	—	—	6	5.76.50	12.09.80
	97	45.30.94	19	19.23.40	11	4.01.64	1	0.45.20	7	6.37.00	75.38.18

Almost all the cases hitherto stated in the communities of Winschoten, Midwolda, Scheemda and Wedde have been found on plots, cultivated by private persons (most of them working-people). The crop of these allotments was in each case destined for private use; in a very few cases early potatoes were grown and hawked about in the streets of Winschoten. The allotments at Nieuw-Weerdinge (Roswinkel Peatgrounds) belong to small

farms that grow potatoes for the factories. Probably the disease has increased so rapidly, because very often potatoes were grown on the same plot for several years consecutively, as the working people lease the allotments for growing their winter provision. It is highly probable however that these caves of disease have not transferred black scab to other allotments and other countries, seeing that no seed-material was grown as an article of commerce. In a very few cases only, seed-potatoes from infected fields were sold, before the latter were known to be affected with the disease.

The cases observed in the years 1916—'20 can only be called new ones inasmuch as they were not noticed before. It has often been stated with certainty that the disease had shown already for some years past. Cases, in which the disease appeared for a period of some years only, are rare.

The origin of the disease in our country has not been traced. On the most strongly affected plots (Winschoten, Zandpad) it appeared to have been known ever since 1907, but the precise date of its first appearance was unknown. No more could it be traced on allotments where the disease had been slighter and, probably, of shorter duration. Only in a few cases (on fields recently tilled) the origin could be established with the invariable result that the seed-material had been got from an infected region. The prohibitive act against growing potatoes on fields declared infected, has put a sudden stop to this evil.

**Means of Fighting the Disease.** No direct method of fighting the disease has as yet turned out efficient. In nearly all countries where black scab is found, more or less exhaustive experiments have been made to disinfect the soil, but nowhere results have been obtained that might justify the adoption of a definite method. In Sweden, at the outset, favourable results have been obtained with formalin, but in the long run the disinfectant proved unsatisfactory. In our country have been tried formalin, carbolineum, creoline and coppersulfate; the latter disinfectant produced some effect, but it was by no means efficient. Abroad, the same result has been obtained with sulphur, which also failed to produce a lasting effect. The strongest evidence of the inefficiency of soil-disinfection is the fact that in England where the disease has attained its greatest extension and is one of the most serious potato-blight, no soil-disinfection whatever is any longer applied: the growers either desist from growing potatoes or cultivate only such varieties as are immune. In our country, too, it will be neces-



sary to grow on infected fields immune varieties exclusively, in order to stop the spread of the disease. This regulation is to be put in force most rigorously.

Of late years the investigations of the susceptibility of several varieties have been numerous and considerable: especially in England, but also in Germany and in our country a great number of varieties have been tested. It appears that there actually are varieties that are perfectly immune. Some of them have been grown for years at a stretch on the same infected plot without showing the least trace of infection. Others were only slightly affected, whereas some — and among them favourite varieties — were most vigorously affected with the warty disease.

None of the „yellow-flesh” varieties, grown in our country proved to be immune. Bravo, Eigenheimer, Zealand-blue, and Red Star, all of them are affected; Red Star least, Bravo most of all. Of the early varieties Andijker Muizen and Schoolmeesters are very susceptible. „White-flesh” varieties, as Preferent, are likewise affected. Only Ceres proved immune, but as a food-potato it is not highly appreciated. The inquiry is being continued.

In England a great many varieties are grown that have proved to be immune; it is held there that varieties, once immune, will continue to be so. An abridged list of such varieties is to be found in Appendix I.

According to German investigators, however, there is no such thing as an absolutely immune variety; immunity depends on cultivation under normal circumstances and the use of absolutely sound seed-material. In a variety beginning to show so-called symptoms of degeneracy — a phenomenon which, according to Prof. Quanjér, is due to mosaic or leaf-roll — the warty disease would break out more or less malignantly, whereas the same variety raised from absolutely sound seed-material, remained free from disease. In Appendix II the reader will find a list of such German varieties as proved immune or at least all but immune; from that list it appears that the opinions of experimentists don't agree on all points; we may say that in only three varieties no black scab has been found after consecutive raising: viz. Danusia, raised by Dolkowsky, Jubel and Juli (both raised by Paulsen).

For the rest, the properties on which susceptibility and immunity depend, are as yet unknown.

## Acts and Regulations against the Spread of Black Scab in

**the Netherlands.** Already at an early date regulations were promulgated for averting the spread of this disease. Before it had entered our dominion, measures were taken to avert the infection, seeing that the plague had attained a large extension, notably in England and Scotland. Pretty large quantities of seed-material were imported from Scotland into Frisia every year, the crop being exported to England. Though, as a rule, the seed-potatoes were carefully selected, the desirability was considered of prohibiting import or of tolerating it conditionally, in case the import might prove to be of essential importance. Such measures, indeed, are not only required for averting the evil, but also to keep the trade on other countries going (i.e. the United States), if in these countries licences of import are dependent upon suchlike measures.

Bij Order in Council of January 23, 1914 (Staatsblad nr. 25) provisions were made which aimed at prevention from infection from the wart disease (and the so-called powdery scab). This Order was replaced by the Act of July 13, 1914 (Staatsblad nr. 324), when Parliament had approved of the provisional regulations.

After the appearance of the disease had been ascertained in October 1915 provisions were made by Order in Council of March 3, 1916 (Staatsblad nr. 100) for fighting the warty disease, and afterwards the regulations of the Act of July 13, 1914, were conjoined with those of the last-mentioned Order in Council into the Act of June 1, 1918 (Staatsblad nr. 108), holding regulations for suppressing and averting potato-diseases. See Appendix III.

The most important provisions of this law are:

1. a prohibition of growing potatoes on plots or parcels of plots, declared infected with black scab by the Secretary of Agriculture, Industry and Trade; likewise the transport of tubers from such plots is prohibited. Tubers affected with the disease are liable to being confiscated and destroyed.

2. an indemnification for confiscated potatoes can be awarded to the owners and to those who are not allowed to grow potatoes on their allotments, in consequence of the interdict on cultivation. Its estimation was first regulated by Order in Council of February 5, 1917 (Staatsblad nr. 206); subsequently, when the law of June 1, 1918, was issued, by Order in Council of December 19, 1918 (Staatsblad nr. 805). See Appendix IV.

In connection with the above provisions the following measures have been taken against the disease from the moment it appeared in our country:



All the grounds on which the disease was discovered, were declared infected by the Secretary of A., I. and T. As soon as the disease was detected, the tubers found on the field were at once confiscated and rendered innocuous by boiling them. The owners were fully indemnified.

The growing of potatoes on fields declared infected is absolutely prohibited. Every year the tenants of the allotments were indemnified for their losses.

In the spring of 1920 a licence was given for growing the variety Ceres which had proved to be immune, to such persons as claimed it. This measure is to be continued.

Every year the potatoes grown in districts, in which infected fields are lying, are subjected to a minute examination both during their growth and during the harvest, in order to be able to apply the above measures to all the grounds where black scab is found. In the autumn of 1920 four inspectors are engaged on this work. The cases, now stated, were mostly of no serious nature; however, the investigations are to be continued, so long as fresh cases shall be discovered.

It is also of the inspectors' competency to detect transgressions of the law and to see that on plots that have a licence for growing immune varieties, the latter species are exclusively cultivated.

In order to prevent infection from seed-material imported from Great-Britain provisions have been made in connection with Clause 1 of the law of July 1, 1918 (Staatsblad nr. 309) by Order of Council of Sept. 7, 1920 (Staatsblad nr. 66); said provisions allow the import of potatoes from Great-Britain on condition:

1. that the consignment shall be provided with a certificate, issued by an official expert, stating that on the field of growth, the wart disease has never been detected;

2. that the consignment shall be examined at arrival, and is found free from black scab. It being practically impossible not to apply these provisions to food-potatoes when they are stringent with respect to seed-tubers, they must involve all potatoes, imported from Great-Britain. The complete text of the Order in Council will be found in Appendix V.

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## APPENDIX I.

A list of some English varieties of potatoes, thought in that country to be immune from the Wart Disease.

A complete list has been published by the Ministry of Agriculture and Fisheries, 72, Victoriastreet, London: S. W. I.

Early.	Late.
Ashleaf (Broadleaf).	Abundance (Sutton).
Ashleaf (Sutton).	Arran Victory (McKelvie).
Boston Kidney (Tunnard).	Bishop (Wilson).
Dargill Early (Gardiner).	Dominion (Poad).
Edzell Blue.	Golden Wonder.
Resistant Snowdrop (Dobbie).	Kerr's Pink.
Witch Hill (Brown).	Langworthy (Niven).
	Majestic (Findlay).
Second Early.	Templar (Nilson).
Ally (McKelvie).	The Lochar (Farish).
Arran Comrade (McKelvie).	Tinwald Perfection (Farish).
Great Scot (McAlister).	
King George.	

## APPENDIX II.

A List of German varieties, immune from the Warty Disease under normal circumstances.

Published by E. Schaffnit <sup>1)</sup>.

Early.	Late.
<sup>2)</sup> Blaue Nieren.	<sup>2)</sup> Ada.
<sup>4)</sup> Juli (Paulsen).	Amerik. Riesen.
<sup>2)</sup> Sechs Wochen verb. lange.	<sup>4)</sup> Danusia (Dolkowski).
<sup>3)</sup> Trog 37.02.	<sup>4)</sup> Jubel (Paulsen).
<sup>2)</sup> Wohl geschmack.	Kalif.
	<sup>2)</sup> Prof. Märcker.
Second Early:	<sup>3)</sup> Roland.
<sup>3)</sup> Isolde.	<sup>3)</sup> Sokol.
<sup>2)</sup> Koralle.	<sup>2)</sup> Soliman.
<sup>2)</sup> Matador II.	
<sup>3)</sup> Topas.	Very late:
<sup>2)</sup> Weisse Riesen.	<sup>3)</sup> Agraria.
	<sup>2)</sup> Erika.

<sup>1)</sup> E. Schaffnit. Versuche zur Bekämpfung des Kartoffelkrebses, Zeitschrift für Pflanzenkrankheiten. Jahrgang 1920, Heft 2, 3.

<sup>2)</sup> Varieties found by Schaffnit to be susceptible of Black Scab, if raised from seed-material of a so-called degenerated branch.

<sup>3)</sup> Varieties in which Black Scab was found by E. Werth. See E. Werth. Versuche zur Bekämpfung des Kartoffelkrebses. Biologische Reichsanstalt für Land- und Forstwirtschaft. Jahrgang 1919, Heft 17.

<sup>4)</sup> Varieties in which no Black Scab was found by the above investigators after 4 and 5 years of cultivation.



### APPENDIX III.

#### Act of June 1, 1918, containing provisions for averting or combating potato-diseases.

##### CLAUSE 1.

Pursuant to the averting of the Wart Disease of Potatoes (black scab) caused by *Chrysophlyctis endobiotica*, and of the powdery scab, caused by *Spongospora subterranea*, the import and transit of potatoes from specially indicated countries may be prohibited or conditionally allowed by Order of Council.

##### CLAUSE 2.

It is prohibited to import into or to convey through our country potatoes, the import and transit of which has been conditionally granted, by way of other agencies than such as have been designated by the Secretary of Agriculture, Industry and Trade.

##### CLAUSE 3.

If the import or transit of potatoes is granted upon the condition of a preliminary test, a remuneration is charged of the cost of said examination, according to tariff fixed by Order of Council.

##### CLAUSE 4.

If potatoes show symptoms of the wart disease, the tenant of the allotment where the potatoes are to be found, shall in continently give notice to the mayor of the community, in which said allotment is situated.

##### CLAUSE 5.

If a mayor be informed of wart disease being found on an allotment in his community, he shall at once give notice to the Chief of the Phytopathological Service.

##### CLAUSE 6.

If on an allotment potatoes are found that are affected with the warty disease, the potatoes on said allotment shall be wholly or partly confiscated by the mayor of the community in which the allotment is situated, whenever the Chief of the Phytopathological Service thinks meet.

If the Chief of the Phytopathological Service thinks meet, the confiscated potatoes shall be rendered innocuous in a way he thinks fit.

The cost of the latter proceeding shall be reimbursed by Government.

## CLAUSE 7.

If the mayor should object to the above measures, he may appeal within three days to the Secretary of Agriculture, Industry and Trade, who will settle the matter within seven days, after appeal has been made.

## CLAUSE 8.

The transport of potatoes from allotments or parcels of allotments, declared by the S. of A. I. and T. to be affected with black scab, is prohibited.

## CLAUSE 9.

In special cases the Chief of the Phyt. Service can grant dispensation from the prohibition sub Clause 8, on conditions he shall make known.

## CLAUSE 10.

It is prohibited to grow or cause to grow potatoes on allotments or parcels of allotments, declared by our S. of A. I. and T. to be affected with the warty disease.

A declaration that a field is infected shall be made publicly known by the mayor of the community in which the field is situated, in the usual manner of publishing local regulations, the transgressors of which are liable to punishment.

## CLAUSE 11.

At the request of the party interested, dispensation from the prohibition in Clause 10 is granted by the mayor of the community in which the allotment is situated, provided the Chief of the Phyt. Service do not object to said dispensation and upon conditions he will think meet.

## CLAUSE 12.

Owners of potatoes rendered innocuous and owners or tenants of parcels declared infected can be indemnified by Government according to rates of reimbursement to be fixed by ministerial decree.

## CLAUSE 13.

The present act may be quoted as „Potato-Act”.

## CLAUSE 14.

Upon the coming into force of this act, the act of July 13, 1914 (Staatsblad nr. 324), containing provisions for averting potato-diseases, is abolished.

## APPENDIX IV.

Order of Council of December 19, 1918, containing provisions concerning the indemnification to be awarded of potatoes rendered innocuous, and to the proprietor or tenants of allotments declared infected.

### CLAUSE 1.

One or more committees shall be instituted by the S. of A. I. and T. for the valuation of damages, suffered by the owners of potatoes rendered innocuous, or by the proprietors or tenants of such allotments, as have been declared infected, which damages are to be reimbursed (in application of the Act of June 1, 1918 (*Staatsblad* no. 309)).

### CLAUSE 2.

Whenever damages, as circumscribed in Clause 1, are to be appraised, notice is given to the Committee concerned by the Chief of the Phyt. Service.

The Committee shall appraise the damage and shall inform the S. of A. I. and T. of the valuation within a month's time.

### CLAUSE 3.

If — on behalf of measures against the wart disease of potatoes (black scab) caused by *Chrysophlyctis endobiotica* — tubers are rendered innocuous before harvest-time, the damage, suffered by the owner, shall be computed at the net proceeds of the allotment in case the potatoes should not have been rendered innocuous.

In case this should happen during harvest-time the damage is valued according to the weight of the potatoes confiscated.

### CLAUSE 4.

The damages, suffered by tenants of allotments declared infected, shall be appraised every year in observance of:

- a. the area of each of the parcels, that would probably have been planted with an early crop or a late one;
- b. the output that would probably have been obtained in normal circumstances;
- c. the normal yield of the crop that is grown on said area after its being declared infected.

### CLAUSE 5.

The damage, suffered by proprietors of allotments declared infected, shall be appraised in observance of the falling off of the rent-money, so far the latter may be due to said declaration.



## CLAUSE 6.

The S. of A. I. and T. shall inform the party interested of the valuations, circumscribed in Clauses 3, 4 and 5.

The party interested is authorized to send in his objections to the S. of A. I. and T. within a fortnight after date of the missive, mentioned in the preceding paragraph.

## CLAUSE 7.

The amount of indemnification shall be fixed by Government.

## CLAUSE 8.

At the coming into force of this Order, the Order of Council of February 5, 1917 is declared null and void. (*Staatsblad nr. 206*).

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## APPENDIX V.

### Order of Council of September 7, 1920, Nr. 66.

#### CLAUSE 1.

Any one that intends to import into or to convey through this country potatoes from Great-Britain, shall have to give notice to the Chief of the Phytopathological Service five days at the least before the day of arrival, upon presentation of a transcript of a statement of some competent authority of the said country, founded on an investigation of experts and stating name of port and presumable day of arrival.

#### CLAUSE 2.

Whenever potatoes from Great-Britain are entered at the customs for import or transit, the customhouse-officers shall at once give notice to the Chief of the Phytopathological Service.

#### CLAUSE 3.

Said potatoes shall be denied clearing-in, unless:

a. they be presented for import or transit in marked sacks, sealed by the officials mentioned in Clause 1;

b. on being presented for import or transit the statement, named in Clause 1, is to be produced, stating that experts have ascertained that on the fields of growth, the warty disease, caused by *Chrysophlyctis endobiotica*, has never been found; moreover a statement, made by the said experts, concerning the quantity and variety of the potatoes, the manner of packing and the marks it bears;

c. they be examined by or by order of the Chief of the Phytopathological Service. and found exempt from black scab.

#### CLAUSE 4.

This Order shall come into force on the second day after the date of the *Staatscourant*, in which it shall be inserted.

## EXPLANATION OF THE FIGURES.

### PLATE I.

- Fig. 1. Stalks of potato-plants with cauliflowerlike warts in the axils of the nether leaves.  
Fig. 2. Warty excrescences on stolons and young potatoes.

### PLATE II.

- Fig. 3-6. Potatoes, affected with black scab in various degrees.  
Fig. 7. Sporangia of *Chrysophlyctis endobiotica* in the tissue of a potato-tuber.

### PLATE III.

- Fig. 8. Map of Winschoten and surroundings (scale 1 : 20.000) on which the allotments declared infected, are indicated.

### PLATE IV.

- Fig. 9. Map of Oostwold, comm. Midwolda (scale 1 : 20.000).  
Fig. 10. Map of Nieuw-Weerdinge, comm. Emmen (scale 1 : 20.000).  
Fig. 11. Map of Eexta, comm. Scheemda, (scale 1 : 20.000).  
Fig. 12. Map of Wedde, (scale 1 : 20.000).

### PLATE V.

- Fig. 13. Map of the Netherlands (scale 1 : 1.200.000) indicating the localities where black scab was observed, and the total area, declared infected, in proportion of the entire country.
-





Fig. 1



Fig. 2



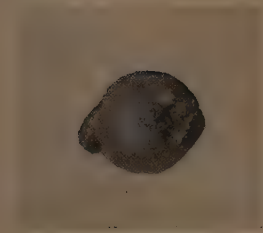


Fig. 3

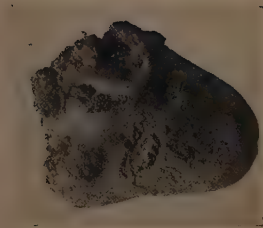


Fig. 4



Fig. 5

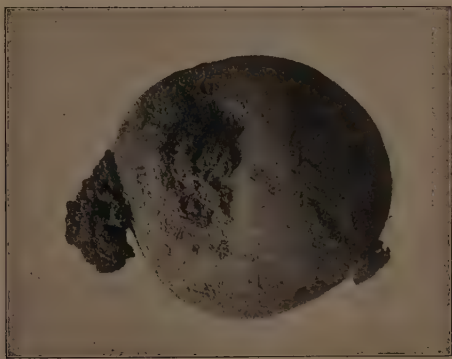


Fig. 6

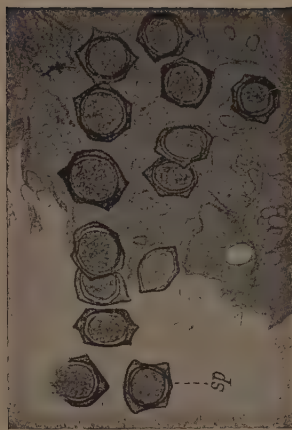


Fig. 7







Fig. 8 ■ Allotments declared infected.





Fig. 9

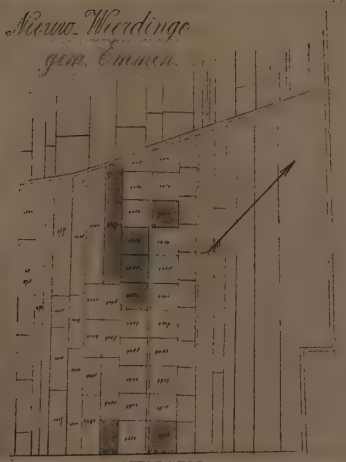


Fig. 10



Fig. 11



Fig. 12

■ Allotments declared infected.





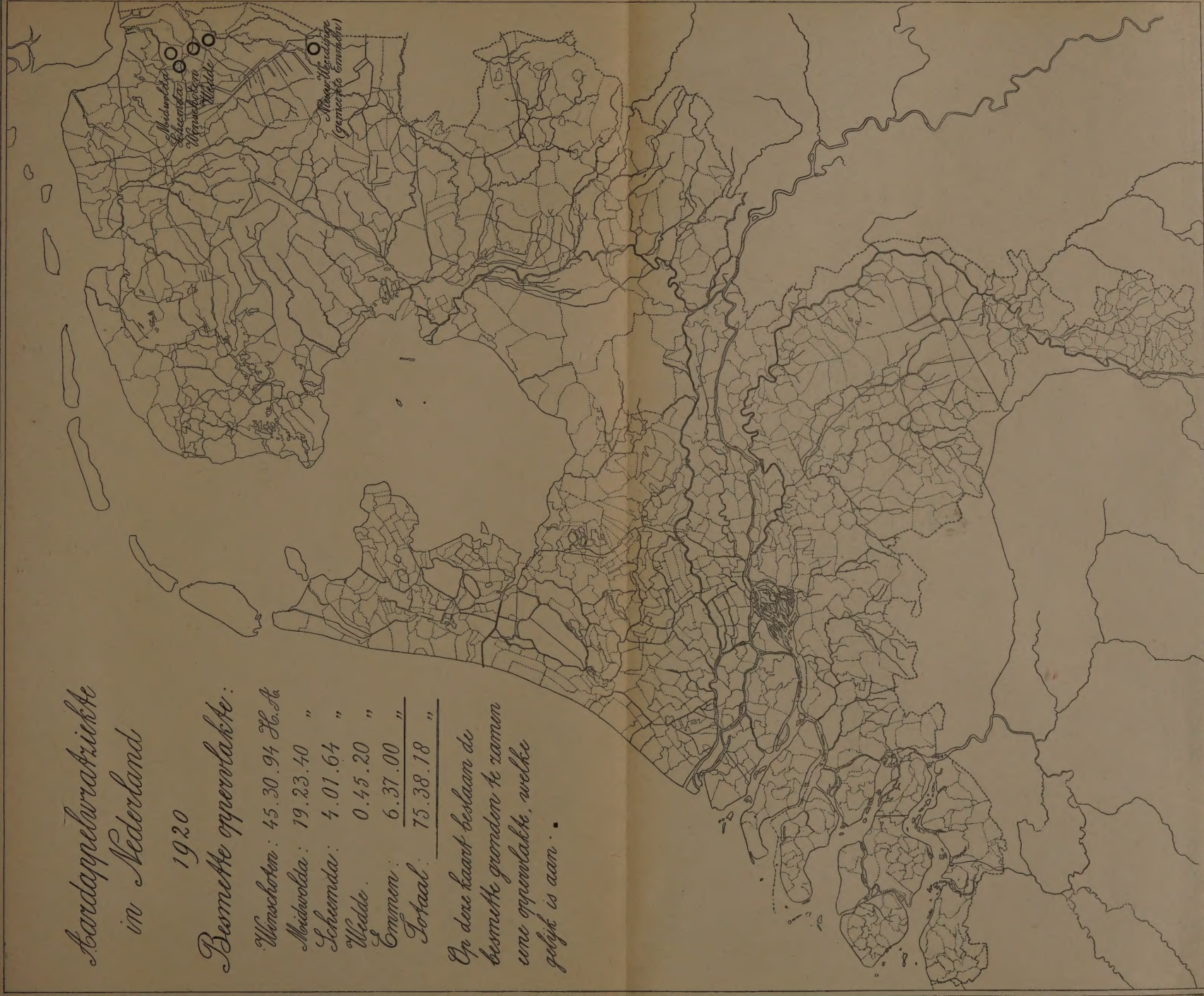
# Aardappelvraatschade in Nederland

1920

## Bemette opervlakte:

Winschoten:	45.30.94 H.A.
Midwolda:	19.23.40 "
Schermda:	4.01.64 "
Widde:	0.45.20 "
Gronnen:	6.37.00 "
Totaal:	75.38.18 "

In deze kaart bestaan de  
bemette gronden te zamen  
ene opervlakte, welke  
geleyt is aan .







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- No. 33. De elzen- en wilgensnuittor (*Cryptorhynchus lapathi* L.).
- No. 34. Wilgenhaantjes.
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